Natural Sciences 102 -- Spring 2005

Homework #4, April 26, 2005
Due in class May 3, 2005

1. **Degrees, seconds, _et al.:_ (Please show you work.)**

   a) Convert 10 degrees to seconds of arc
   b) Convert 0.01 radians to seconds of arc

2. **Parsecs and parallax: (Please show your work.)**

   a) A star has an annual stellar parallax of 0.1". What is its distance?
   b) A star is 30 pc distant. What is its annual stellar parallax?

3. **Parallax: (Please show you work.)**
   a) What is annual stellar parallax? What moves, and what appears to move?
   b) Draw a diagram relating the parallax angle to distances known by other means and distances determined by parallax.
   c) The annual stellar parallax of the star Vallinotto-456 is measured to be 0.02 seconds of arc. What is its distance?

4. **Skinny Triangles:**
Complete the following table:

Angle in degrees	Angle in radians	Tangent of angle	Sine of angle
1°			
3°			
10°			
30°			
50°			

5. **Magnitudes: (Please show you work.)**
A new class of dim, dull, stars has recently been discovered. They are called Bush stars. The quintessential Bush star, W-Bush, has a luminosity of 0.04 times the solar luminosity and is 1 pc distant.
   c) What is its apparent magnitude of W-Bush?
   d) What is the annual stellar parallax of W-Bush?

6. **Let there be lightbulbs: (Please show your work.)**
The luminosity of the star Arcturus is 10 solar luminosities $= 4 \times 10^{28}$ W and Arcturus is a 0th – magnitude star 10 pc distant.
   a) How far away (in pc) would a 40 W light bulb be to appear as bright as Arcturus?
   b) If there are 4×10^{18} cm in a pc, how far away in cm would the light bulb be?